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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/505,470

08/20/2004

Tae-Sun Song

29347/42017

1714

4743 7590 11/02/2007
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EXAMINER

PATEL, GAUTAM

ART UNIT

PAPER NUMBER

2627

MAIL DATE

DELIVERY MODE

11/02/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/505,470	Applicant(s) SONG, TAE-SUN	
	Examiner Gautam R. Patel	Art Unit 2627	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 February 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>2/1/07</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 1-13 are pending for the examination.

Priority

2. Receipt is acknowledged of papers submitted under 35 U.S.C. § 119(a)-(d), which papers have been placed of record in the file.

IMPORTANT NOTES & REMARKS

3. The specification has not been sent to the extent necessary to determine the presence of all possible minor errors. Several places have white-outs which blocks important lines. For example claim 1 lines 15-17. Claim 7, lines 16-17. also specification has the same problems.

Applicant's cooperation is requested in correcting these errors of which Applicant may become aware in the specification. Also send a proper legible copy specification AND claims such that these lines do not produce any errors in examining and patenting.

Objection to Specification

4. The disclosure is objected for following reasons.
The disclosure is objected to because of the following informalities: Many lines in specification and claims are not legible. Clean copies of both are requested.
Appropriate corrections are required.

Claim Objections

5. Claims 1, 7 are objected for following reasons.
Many lines in specification and claims are not legible
Corrections are required.

Claim Rejections - 35 U.S.C. § 112

6. The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 3 & 9 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 3, line 4 has a symbol “ ~ ” is confusing and unclear. If this symbol is interpreted as “approximate”, it makes claims indefinite, since no limits on any parameter are defined in the specification. Claim 9 has the same problem.

Claim Rejections - 35 U.S.C. § 103

7. The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-13 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Kikuchi et al., US. patent 6,353,582 (hereafter Kikuchi) in view of Matsui et al., US Patent 6,498,776 (hereafter Nakano).

As to claim 1, Kikuchi discloses the invention as claimed [see Figs. 1, 9 & 11] including a light source, a collimator lens, a beamsplitter, an objective lens system, a light-receiving module, a focus control unit and a position adjustment unit, comprising:

- a light source [fig. 9, unit 51] generating and emitting light beams;

- a collimator lens [fig. 9, unit 52] collimating the emitted light beams from the light source into collimated beams;

- a beamsplitter [fig. 9, unit 53] enabling a part of the collimated beams to pass there through;

- an objective lens system [units 56, 59, 55 and 54], placed on an optical path between the beamsplitter and the optical recording medium, focusing the collimated beams from the beamsplitter,

- a light-receiving module [fig. 9, unit 60] receiving the light beam reflected from the optical recording medium and converting it into electrical signals;

a focus control unit [fig. 12, focus servo system] generating a focus control signal for focus control, in response to the electric signal from the light-receiving module; and

a position adjustment unit [fig. 1, unit 40 or fig. 12, unit 67], connected to the light source or the collimated lens, making the light source or the collimated lens shift in response to the focus control signal generated from the focus control unit [col. 2, line 61 to col. 3, line 13; col. 5, lines 14-48; col. 6, line 60 to col. 7, line 8 and figs. 1, 9 and 12].

Kikuchi discloses all of the above elements, including an objective lens assembly and a condenser lens.

Kikuchi does not specifically disclose the objective lens system comprising:

a solid immersion lens and details [such as a coupling lens] that is normally associated with a near-field assembly.

However, use of near-field assembly is well known in the art for a while now. Also more importantly Nakano clearly discloses:

an objective lens system [fig. 1, units 14-16 and 12] that has a solid immersion lens [fig. 1, unit 15], and details [such as a coupling lens] that is normally associated with a near-field assembly [col. 3, lines 1-36].

Both Kikuchi and Nakano are interested in improving the light converging system in an optical disk device. Both show objective lens assembly.

One of ordinary skill in the art at the time of invention would have realized that system of Kikuchi could be easily improved for high density recording.

Therefore, it would have been obvious to have used a near-field lens and associated details in the system of Kikuchi as taught by Nakano because one would be motivated to reduce the spot diameter and thus increase recording density in the system of Kikuchi and also provide higher NA without using expensive objective lens [col. 1, lines 16-35; Nakano].

8. The aforementioned claim 2, recites the following elements, inter alia, disclosed in Kikuchi:

the objective lens system further comprises a condenser objective lens [fig. 9, unit 59].

9. The aforementioned claim 3, recites the following elements, inter alia, disclosed in Kikuchi:

the distance between the collimated lens and the light source is changed by an amount L satisfying the following:

$L \sim (f1/f2)^2 \times (\Delta d/n)$ where Δd represents the deviation in the optical thickness of the substrate of the optical recording medium; n represents a refractive index of the substrate; and $f1$ and $f2$ represent focal lengths of the collimated lens and the objective lens system, respectively [col. 4, line 46 to col. 5, line 67].

10. The aforementioned claim 4, recites the following elements, inter alia, disclosed in Kikuchi:

the light source is a laser diode [col. 6, line 61].

11. The aforementioned claim 5, recites the following elements, inter alia, disclosed in Kikuchi:

the focus control unit detects focus errors by a detection method that is selected from beam size detection, astigmatism detection, knife-edge detection, and hologram-Foucault detection [col. 6, lines 5-16].

12. The aforementioned claim 6, recites the following elements, inter alia, disclosed in Nakano:

an air gap control unit [inherently present in a near-field lens system when gap is controlled] for maintaining a distance between the solid immersion lens and the optical recording medium [col. 4, line 36 to col. 5, line 15].

13. As to claims 7-8, they are rejected for the similar reasons set forth in the rejection of claims 1-2 respectively, above.

14. The aforementioned claim 9, recites the following elements, inter alia, disclosed in Kikuchi:

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$L \sim (s1/s2)^2 \times (\Delta d/n)$ where Δd represents the deviation in the optical thickness of the substrate of the optical recording medium; n represents a refractive index of the substrate; $s1$ represents an optical path length between the light source and the solid immersion lens; and $s2$ represents an optical path length between the solid immersion lens and the optical recording medium [col. 4, line 46 to col. 5, line 67].

15. As to claims 10-12, they are system claims corresponding to claims 10-12 respectively and they are therefore rejected for the similar reasons set forth in the rejection of claims 10-12 respectively, above.

16. The aforementioned claim 13, recites the following elements, inter alia, disclosed in Nakano:

a coupling lens [fig. 1, unit 12], placed between the light source and the beamsplitter, enabling optical power of the objective lens system to be distributed, wherein the position adjustment unit is connected to the coupling lens [col. 3, lines 1-30].

ALTERNATE REJECTION

17. Claims 1-13 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Kikuchi et al., US. patent 6,353,582 (hereafter Kikuchi) in view of Matsui et al., US Patent 7,042,826 (hereafter Matsui).

As to claim 1, Kikuchi discloses the invention as claimed [see Figs. 1, 9 & 11] including a light source, a collimator lens, a beamsplitter, an objective lens system, a light-receiving module, a focus control unit and a position adjustment unit, comprising:

a light source [fig. 9, unit 51] generating and emitting light beams;

a collimator lens [fig. 9, unit 52] collimating the emitted light beams from the light source into collimated beams;

a beamsplitter [fig. 9, unit 53] enabling a part of the collimated beams to pass there through;

an objective lens system [units 56, 59, 55 and 54], placed on an optical path between the beamsplitter and the optical recording medium, focusing the collimated beams from the beamsplitter,

a light-receiving module [fig. 9, unit 60] receiving the light beam reflected from the optical recording medium and converting it into electrical signals;

a focus control unit [fig. 12, focus servo system] generating a focus control signal for focus control, in response to the electric signal from the light-receiving module; and

a position adjustment unit [fig. 1, unit 40 or fig. 12, unit 67], connected to the light source or the collimated lens, making the light source or the collimated lens shift in response to the focus control signal generated from the focus control unit [col. 2, line 61 to col. 3, line 13; col. 5, lines 14-48; col. 6, line 60 to col. 7, line 8 and figs. 1, 9 and 12].

Kikuchi discloses all of the above elements, including an objective lens assembly and a condenser lens.

Kikuchi does not specifically disclose the objective lens system comprising:

a solid immersion lens which has a planar surface facing the substrate of the optical recording medium, and details [such as a coupling lens] that is normally associated with a near-field assembly.

However, use of near-field assembly is well known in the art for a while now. Also more importantly Matsui clearly discloses:

an objective lens system [fig. 2, units 1a, 1b, 5 and 6] that has a solid immersion lens [fig. 2, unit 1b], and details [such as a coupling lens] that is normally associated with a near-field assembly [col. 42, line 35 to col. 43, line 36].

Both Kikuchi and Matsui are interested in improving the light converging system in an optical disk device. Both show objective lens assembly.

One of ordinary skill in the art at the time of invention would have realized that system of Kikuchi could be easily improved for high density recording.

Therefore, it would have been obvious to have used a near-field lens and associated details in the system of Kikuchi as taught by Matsui because one would be motivated to reduce the spot diameter and thus increase recording density in the system of Kikuchi and also provide higher NA without using expensive objective lens [col. 1, lines 22-44; Matsui].

18. The aforementioned claim 2, recites the following elements, inter alia, disclosed in Kikuchi:

the objective lens system further comprises a condenser objective lens [fig. 9, unit 59].

19. The aforementioned claim 3, recites the following elements, inter alia, disclosed in Kikuchi:

the distance between the collimated lens and the light source is changed by an amount L satisfying the following:

$$L \sim (f1/f2)^2 \times (\Delta d/n)$$
 where Δd represents the deviation in the optical thickness of the substrate of the optical recording medium; n represents a refractive index of the substrate; and f1 and f2 represent focal lengths of the collimated lens and the objective lens system, respectively [col. 4, line 46 to col. 5, line 67].

20. The aforementioned claim 4, recites the following elements, inter alia, disclosed in Kikuchi:

the light source is a laser diode [col. 6, line 61].

21. The aforementioned claim 5, recites the following elements, inter alia, disclosed in Kikuchi:

the focus control unit detects focus errors by a detection method that is selected from beam size detection, astigmatism detection, knife-edge detection, and hologram-Foucault detection [col. 6, lines 5-16].

22. The aforementioned claim 6, recites the following elements, inter alia, disclosed in Matsui:

an air gap control unit [inherently present in a near-field lens system when gap is controlled] for maintaining a distance between the solid immersion lens and the optical recording medium [col. 46, line 66 to col. 47, line 30 & col. 47, lines 56-64].

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23. As to claims 7-8, they are rejected for the similar reasons set forth in the rejection of claims 1-2 respectively, above.

24. The aforementioned claim 9, recites the following elements, inter alia, disclosed in Kikuchi:

$L \sim (s1/s2)^2 \times (\Delta d/n)$ where Δd represents the deviation in the optical thickness of the substrate of the optical recording medium; n represents a refractive index of the substrate; $s1$ represents an optical path length between the light source and the solid immersion lens; and $s2$ represents an optical path length between the solid immersion lens and the optical recording medium [col. 4, line 46 to col. 5, line 67].

25. As to claims 10-12, they are system claims corresponding to claims 10-12 respectively and they are therefore rejected for the similar reasons set forth in the rejection of claims 10-12 respectively, above.

26. The aforementioned claim 13, recites the following elements, inter alia, disclosed in Matsui:

a coupling lens [fig. 2, unit 15], placed between the light source and the beamsplitter, enabling optical power of the objective lens system to be distributed, wherein the position adjustment unit is connected to the coupling lens [col. 42, lines 35-67].

Other prior art cited

27. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- a) Hayashi et al. (US. Patent 5703856)
- b) Ikegame (US. patent 6680893)
- c) Hendriks (US. patent 6151174)
- d) Ichimura et al. (US. patent 6151174).

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Contact information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gautam R. Patel whose telephone number is 571-272-7625. The examiner can normally be reached on Monday through Thursday from 7:30 to 6.

The appropriate fax number for the organization (Group 2600) where this application or proceeding is assigned is 571-273-8300.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Dwayne Bost, who can be reached on (571) 272-7023.

Any inquiry of a general nature or relating to the status of this application should be directed to the Electronic Business Center whose telephone number is 866-217-9197 or the USPTO contact Center telephone number is (800) PTO-9199.

Gautam R. Patel
Primary Examiner
Group Art Unit 2627

October 29, 2007



**GAUTAM R. PATEL
PRIMARY PATENT EXAMINER**